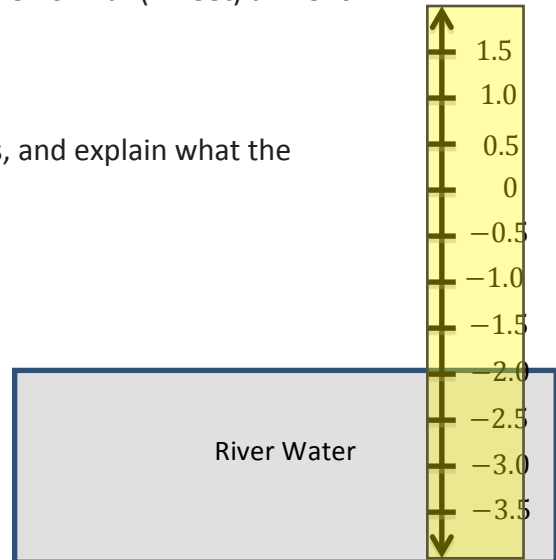


Name _____

Date _____

1. The picture below is a flood gauge that is used to measure how far (in feet) a river's water level is above or below its normal level.

- a. Explain what the number 0 on the gauge represents, and explain what the numbers above and below 0 represent.

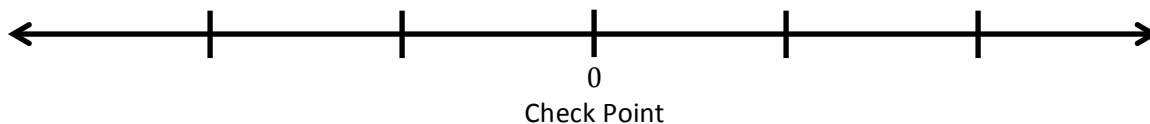


- b. Describe what the picture indicates about the river's current water level.
- c. What number represents the opposite of the water level shown in the picture, and where is it located on the gauge? What would it mean if the river water was at that level?
- d. If heavy rain is in the forecast for the area for the next 24 hours, what reading might you expect to see on this gauge tomorrow? Explain your reasoning.

2. A local park's programs committee is raising money by holding mountain bike races on a course through the park. During each race, a computer tracks the competitors' locations on the course using GPS tracking. The table shows how far each competitor is from a check point.

Competitor Name	Distance to Check Point
Florence	0.1 mile before
Mary	$\frac{2}{5}$ mile past
Rebecca	0.5 mile before
Lita	$\frac{1}{2}$ mile past
Nancy	$\frac{2}{10}$ mile before

- a. The check point is represented by 0 on the number line. Locate and label points on the number line for the positions of each listed participant. Label the points using rational numbers.



- b. Which of the competitors is closest to the check point? Explain.
- c. Two competitors are the same distance from the check point. Are they in the same location? Use absolute value to explain.
- d. Who is closer to finishing the race, Nancy or Florence? Support your answer.

3. Andréa and Marta are testing three different coolers to see which keeps the coldest temperature. They placed a bag of ice in each cooler, closed the coolers, and then measured the air temperature inside each after 90 minutes. The temperatures are recorded in the table below:

Cooler	A	B	C
Temperature (°C)	−2.91	5.7	−4.3

Marta wrote the following inequality statement about the temperatures:

$$-4.3 < -2.91 < 5.7.$$

Andréa claims that Marta made a mistake in her statement and that the inequality statement should be written as

$$-2.91 < -4.3 < 5.7.$$

- a. Is either student correct? Explain.
- b. The students want to find a cooler that keeps the temperature inside the cooler more than 3 degrees below the freezing point of water (0°C) after 90 minutes. Indicate which of the tested coolers meets this goal and explain why.

4. Mary manages a company that has been hired to flatten a plot of land. She took several elevation samples from the land and recorded those elevations below:

Elevation Sample	A	B	C	D	E	F
Elevation (ft. above sea level)	826.5	830.2	832.0	831.1	825.8	827.1

- a. The landowner wants the land flat and at the same level as the road that passes in front of it. The road's elevation is 830 feet above sea level. Describe in words how elevation samples B, C, and E compare to the elevation of the road.

- b. The table below shows how some other elevation samples compare to the level of the road:

Elevation Sample	G	H	I	J	K	L
Elevation (from the road)	3.1	-0.5	2.2	1.3	-4.5	-0.9

Write the values in the table in order from least to greatest.

_____ < _____ < _____ < _____ < _____ < _____

- c. Indicate which of the values from the table in part (b) is farthest from the elevation of the road.
Use absolute value to explain your answer.

5. Mr. Kindle invested some money in the stock market. He tracks his gains and losses using a computer program. Mr. Kindle receives a daily email that updates him on all his transactions from the previous day. This morning, his email read as follows:

*Good morning, Mr. Kindle,
Yesterday's investment activity included a loss of \$800, a gain of \$960, and another gain of \$230. Log in now to see your current balance.*

- a. Write an integer to represent each gain and loss.

Description	Integer Representation
Loss of \$800	
Gain of \$960	
Gain of \$230	

- b. Mr. Kindle noticed that an error had been made on his account. The “loss of \$800” should have been a “gain of \$800.” Locate and label both points that represent “a loss of \$800” and “a gain of \$800” on the number line below. Describe the relationship of these two numbers when zero represents no change (gain or loss).



- c. Mr. Kindle wanted to correct the error, so he entered $-(-\$800)$ into the program. He made a note that read, “The opposite of the opposite of \$800 is \$800.” Is his reasoning correct? Explain.

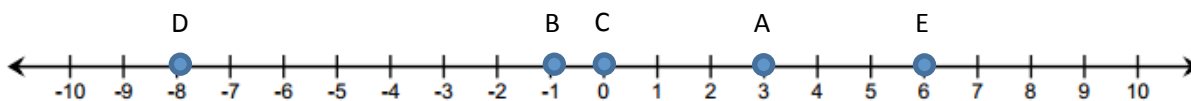
6. At 6:00 a.m., Buffalo, NY had a temperature of 10°F . At noon, the temperature was -10°F , and at midnight it was -20°F .

a. Write a statement comparing -10°F and -20°F .

b. Write an inequality statement that shows the relationship between the three recorded temperatures. Which temperature is the warmest?

7. Point P is located at -3 .

a. Locate and label the point P at -3 below.



b. Select all the statements below that are true.

☐

Point A is the opposite of P .

☐

Point B is a number less than P .

☐

Point C is a number greater than P .

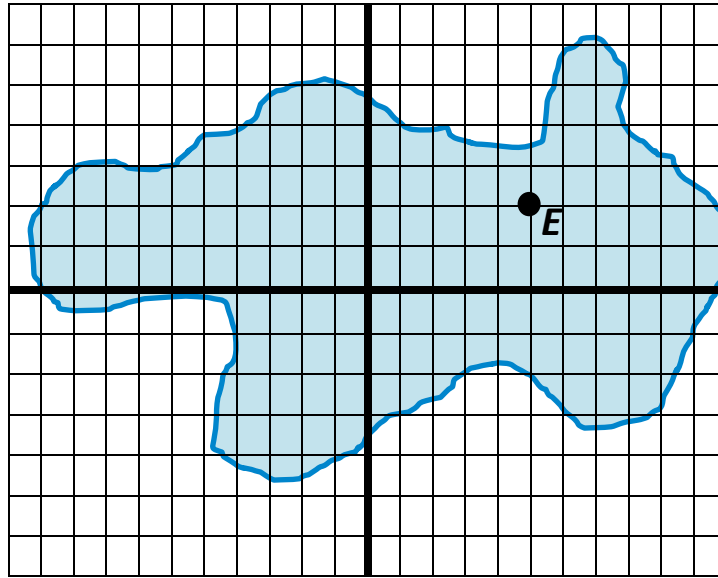
☐

Point D has an absolute value greater than Point P .

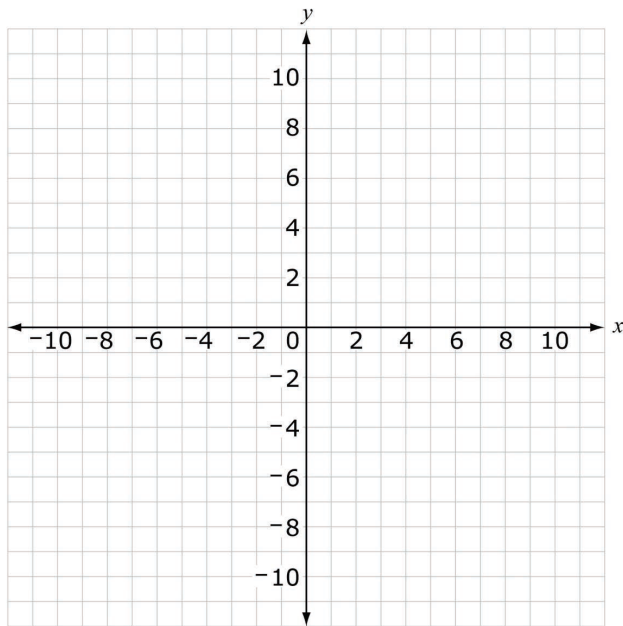
☐

Point E is exactly 10 units away from Point P .

8. For centuries, a mysterious sea serpent has been rumored to live at the bottom of Mysterious Lake. A team of historians used a computer program to plot the last five positions of the sightings.



- Locate and label the locations of the last four sightings: $A\left(-9\frac{1}{2}, 0\right)$, $B(-3, -4)$, $C(9, 2)$, and $D(8, -2.5)$.
- Over time, most of the sightings occurred in Quadrant III. Write the coordinates of a point that lies in Quadrant III.
- What is the distance between point A and the point $\left(9\frac{1}{2}, 0\right)$? Show your work to support your answer.
- What are the coordinates of point E on the coordinate plane?
- Point F is related to point E . Its x -coordinate is the same as point E 's, but its y -coordinate is the opposite of point E 's. Locate and label point F . What are the coordinates? How far apart are points E and F ? Explain how you arrived at your answer.



9.

a. Plot the points that represent the locations of 5 buildings on the coordinate graph.

- Bank $(-8, 5)$
- School $(-8, -6)$
- Park $(4, 5)$
- Post Office $(-9, 5)$
- Store $(-9, -6)$

b. Use the graph you created to circle True or False for each statement below.

The bank is closer to the school than the post office is from the store.

True

False

The distance from the bank to the school is equal to $5 + |-6|$.

True

False

A library has the same y -coordinate as the store. If the library is the same distance from the store as the park is from the bank, then the x -coordinate of the library is 4.

True

False

The distance from the bank to the post office is equal to $|-8| + |-9|$.

True

False

A Progression Toward Mastery

Assessment Task Item		STEP 1 Missing or incorrect answer and little evidence of reasoning or application of mathematics to solve the problem.	STEP 2 Missing or incorrect answer but evidence of some reasoning or application of mathematics to solve the problem.	STEP 3 A correct answer with some evidence of reasoning or application of mathematics to solve the problem, <u>or</u> an incorrect answer with substantial evidence of solid reasoning or application of mathematics to solve the problem.	STEP 4 A correct answer supported by substantial evidence of solid reasoning or application of mathematics to solve the problem.
1	a 6.NS.C.5 6.NS.C.6a	Student is unable to answer the question. None of the descriptions are correctly represented with an integer although student may make an effort to answer the question.	Student correctly represents only one of the three descriptions with an integer.	Student correctly represents two of the three descriptions with integers.	Student correctly represents all three descriptions with integers: -800 , 960 , 230 .
	b 6.NS.C.5 6.NS.C.6a 6.NS.C.6c	Student does not attempt to locate and label -800 and 800 and provides little or no evidence of reasoning.	Student attempts to locate and label -800 and 800 but makes an error. For example, both integers are not equidistant from 0 . Student may or may not correctly identify the	Student accurately locates but <i>does not label</i> -800 and 800 ; student correctly identifies the relationship between the integers as opposites. <u>OR</u> Student accurately	The student accurately locates and labels -800 and 800 on the number line and identifies the relationship between the integers as opposites.

			relationship as opposites.	locates and labels -800 and 800 on the number line but does not identify the relationship between the integers as opposites.	
	c 6.NS.C.5 6.NS.C.6a	Student response is incorrect, and no evidence of reasoning, such as an explanation or a diagram, is provided.	Student response is incorrect, but student attempts to answer the question with an explanation and/or diagram that demonstrates an understanding of the word “opposite” although it does not address the meaning of “the opposite of the opposite of $\$800$.”	Student response correctly states that: <i>Yes, Mr. Kindle’s reasoning is correct.</i> But the explanation and/or diagram provided does not completely explain why Mr. Kindle’s statement is correct.	Student response correctly states that: <i>Yes, Mr. Kindle’s reasoning is correct.</i> The stance is supported with a valid explanation that demonstrates a solid understanding of the fact that the opposite of the opposite of a number is the number itself.
2	a 6.NS.C.7 b	Student response is missing.	Student provides an incorrect statement but provides some evidence of understanding the ordering of rational numbers in the written work.	Student response provides a correct ordering of -10 and -20 but without units and reference to the context of the situation.	Student response is correct. Student provides the statement: -10°F is warmer than -20°F or -20°F is colder than -10°F . <u>OR</u> Student provides some other explanation that contains a valid comparison of the

				two temperatures.
b 6.NS.C.7a 6.NS.C.7b	Student response is missing.	Student attempts to write an inequality statement, but the statement is incorrect and does not include all three numbers. <u>OR</u> The incorrect inequality statement lists all three numbers but does not list 10 as the greatest value.	Student writes an inequality statement that orders the three values with 10 as the greatest number, but the statement contains an error. For example, $-10 < -20 < 10$.	The correct answer is given as an inequality statement of $-20 < -10 < 10$ or $10 > -10 > -20$, and 10 degrees is the warmest temperature.
c 6.NS.C.7c	Student response is missing.	Student response explains how to use a number line to find the number of degrees below zero the temperature is at noon, but the use of absolute value is not included in the explanation, or it is referenced incorrectly such as $ -10 = -10$.	Student response includes a correct explanation and understanding of absolute value: $ -10 = 10$, but the temperature at noon is incorrectly stated as -10 degrees below 0.	Student response includes a correct explanation and understanding of absolute value: $ -10 = 10$, <u>AND</u> the temperature at noon is correctly stated as 10 degrees below 0.
d 6.NS.C.7c	Student response is missing. <u>OR</u> Student response	Student response is incorrect but shows some evidence of	Student response includes Yes along with a valid explanation that	Student response includes Yes along with a valid explanation that

		is an incomplete statement supported by little or no evidence of reasoning.	reasoning. However, the explanation does not show that as negative numbers increase, their absolute values decrease. Student explanation may or may not be supported with an accurate vertical number line model.	indicates that as negative numbers increase, their absolute values decrease. But a vertical number line model is missing or contains an error.	indicates that as negative numbers increase, their absolute values decrease. The answer is supported with an accurate vertical number line model representing all three temperatures.
3	a 6.NS.C.6a 6.NS.C.6c	Student response is missing. <u>OR</u> There is little or no evidence of understanding in the work shown to determine the correct location and value of point A .	Student incorrectly locates point A (the opposite of point P) on the number line; however, the location of point A indicates some understanding of an integer's opposite.	Student locates the correct point on the number line for the opposite (1, 2, 3, or 4) based on the integer between 0 and -5 (-1 , -2 , -3 , or -4). However, the opposite is not labeled on the number line as point A . <u>OR</u> Student correctly locates and labels point A , the opposite of point P , but point P does not represent an integer between 0 and -5 .	A correct answer of the opposite (1, 2, 3, or 4) is given based on correctly choosing an integer between 0 and -5 (-1 , -2 , -3 , or -4) as point P . The opposite is correctly located on the number line and labeled as point A .

<p>b</p> <p>6.NS.C.6c 6.NS.C.7a</p>	<p>Student response is missing. <u>OR</u> There is little or no evidence of understanding in the work shown to determine the correct location and value of point B.</p>	<p>Student incorrectly locates point B on the number line; however, the location of point B on the number line indicates that point B is not equal to point P.</p>	<p>Student correctly locates a point on the number line to the left of point P; however, the point is not labeled as point B. <u>OR</u> Student correctly locates and labels point B even though point P does not represent an integer between 0 and -5.</p>	<p>Point B is correctly graphed and labeled on the number line. The point is to the left of point P on the number line; for example, if point P is -3, point B could be -5.</p>
<p>c</p> <p>6.NS.C.6c 6.NS.C.7a</p>	<p>Student response is missing. <u>OR</u> There is little or no evidence of understanding in the work shown to determine the correct location and value of point C.</p>	<p>Student incorrectly locates point C on the number line; however, the location of point C on the number line indicates that point C is not equal to point P.</p>	<p>Student correctly locates a point on the number line to the right of point P; however, the point is not labeled as point C. <u>OR</u> Student correctly locates and labels point C, even though point P does not represent an integer between 0 and -5.</p>	<p>Point C is correctly graphed and labeled on the number line. The point is to the right of point P on the number line; for example, if point P is -3, point C could be 0.</p>
<p>d</p> <p>6.NS.C.6c</p>	<p>Student response is missing. <u>OR</u> There is little or no evidence of understanding in the work shown</p>	<p>Student incorrectly locates point D on the number line; however, the location of point D is to the right of</p>	<p>Student correctly locates the number that is halfway between the point P and the integer to the right of point P;</p>	<p>Point D is correctly graphed and labeled on the number line. The point is exactly halfway between point P and the</p>

		to determine the correct location and value of point D .	point P although not half way between the integer to the right of point P and point P .	however, the point is not labeled as point D . <u>OR</u> Student correctly locates and labels point D even though point P does not represent an integer between 0 and -5 . <u>OR</u> Student locates and labels point D as the number that is halfway between point P and the integer to the <i>left</i> of point P .	integer to the right of point P on the number line; for example, if point P is -3 , point D would be -2.5 .
4	a 6.NS.C.5	Student response is missing. <u>OR</u> Student makes an effort to answer the question, but none of the responses are correct.	Student response includes 1, 2, 3, or at most 4 locations represented with correct integers.	Student response includes 5 locations represented with correct integers.	Student response includes all 6 locations represented with the correct integers: 5,343, -210 , 614, 50, 0, -435 .
	b 6.NS.C.5 6.NS.C.7c 6.NS.C.7d	Student response is missing. <u>OR</u> Student makes an effort to answer the question, but the explanation does not provide any evidence of understanding.	Student attempts to provide an explanation, and the explanation is supported with some evidence of reasoning, but it is incomplete. For example, " <i>Positive and negative</i>	Student response includes an explanation with evidence of solid reasoning, but the explanation lacks details. For example, " <i>Positive and negative numbers tell Julia</i>	Student response is correct. An accurate and complete explanation is given, stating that a positive number indicates an elevation above sea level, and a

		<i>numbers tell Julia about sea level.”</i>	<i>how far from sea level a location is.”</i>	negative number indicates an elevation below sea level.
c 6.NS.C.7 b 6.NS.C.7c	Student responses are missing, and/or student only partially fills in the chart.	Student fills in the chart attempting to order the elevations and find their absolute values, but more than two numerical errors are made. <u>OR</u> Student fills in the chart and correctly finds the absolute value of each number but does not order the elevations from least to greatest or from greatest to least.	Student fills in the chart ordering the elevations and listing their absolute values, but one or two numbers are incorrect. <u>OR</u> Student fills in the chart and correctly finds the absolute value of each number; however, the elevations are ordered from <i>greatest to least</i> rather than least to greatest.	Student response is correct and complete. The chart is accurately completed with elevations ordered from least to greatest and their respective absolute values recorded.
d 6.NS.C.5 6.NS.C.7c 6.NS.C.7 d	Student responses are missing. <u>OR</u> Student circles the row with zeros in the chart to represent sea level but provides no further explanation.	Student circles the row with zeros in the chart to represent sea level and provides an explanation that contains some evidence of reasoning although the explanation may be incomplete or contain inaccurate statements.	Student circles the row with zeros in the chart to represent sea level <u>AND</u> provides a valid explanation, but it lacks details. It is supported with some evidence of reasoning though it may be general in nature. For example,	Student circles the row with zeros in the chart to represent sea level, <u>AND</u> an accurate explanation is given and is supported with substantial evidence that sea levels below zero will have opposite absolute values as

				“Elevations below sea level will have different absolute values.”	their elevations, and sea levels above zero will have the same absolute values as their elevations.
5	a 6.NS.C.8	Student response is missing. <u>OR</u> All 4 points are inaccurately located.	Student accurately locates and labels 1–2 points.	Student accurately locates and labels 3 points.	Student accurately locates and labels all 4 points.
	b 6.NS.C.8	Student response is missing.	Student response is incorrect <u>AND</u> neither coordinate is stated as a negative number.	Student response is incorrect, but one of the coordinates is correct. For example, $(-6, 3)$ is the response, and the x -coordinate is correct.	Student provides a correct answer expressed as an ordered pair where both the x - and y -coordinates are negative numbers. For example, $(-6, -3)$.
	c 6.NS.C.8	Student response is missing. <u>OR</u> An incorrect answer is given with little or no application of mathematics used to solve the problem.	Student provides an incorrect answer for the distance, but demonstrates some evidence of understanding how to find the distance between the points although a significant error was made.	Student response correctly states a distance of 19 units, but the work shown does not adequately support the answer. <u>OR</u> An incorrect answer for the distance is given, but the work shown demonstrates a correct process	Student response is complete and correct. The distance between the points is found to be 19 units, and an accurate and complete explanation, process, and/or diagram is provided to support the answer.

				with a minor error. For example, the student made an error in their addition or miscounted when using the number line.	
	d 6.NS.C.8	Student response is missing.	Student response is incorrect and neither coordinate is stated correctly.	Student response is incorrect, but one of the coordinates is correct. For example, $(5, -2)$ is the response, and the x -coordinate is correct.	Student response is correct and complete. Point E 's coordinates are $(5, 2)$.

	<p>e</p> <p>6.NS.C.6</p> <p>b</p> <p>6.NS.C.8</p>	<p>Student response is missing.</p> <p><u>OR</u></p> <p>Student makes an effort to answer the question, but the answer and/or explanation do not provide any evidence of understanding.</p>	<p>Student does not arrive at the correct coordinates for point F and may or may not arrive at the correct distance between points E and F. But there is some evidence of understanding how to locate a point related to point E and/or how to find the distance between the two points.</p>	<p>Student response is partially correct. Point F is correctly located and labeled, and its coordinates are given as $(5, -2)$, but the student is unable to arrive at the correct distance between points E and F or is unable to explain the process accurately.</p>	<p>Student correctly completes all 3 tasks. Point F is correctly located and labeled on the coordinate grid, and its coordinates are given as $(5, -2)$. The distance between points E and F is 4 units and is supported with substantial evidence of reasoning.</p>
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Name Student

Date _____

1. Mr. Kindle invested some money in the stock market. He tracks his gains and losses using a computer program. Mr. Kindle receives a daily email that updates him on all his transactions from the previous day. This morning, his email read as follows:

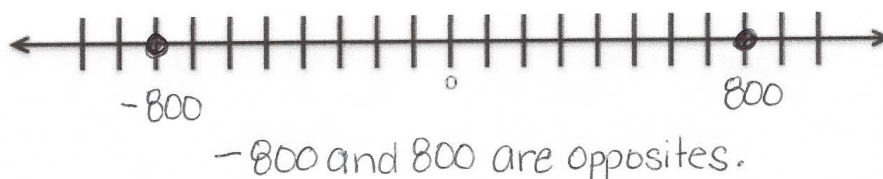
Good morning, Mr. Kindle,

Yesterday's investment activity included a loss of \$800, a gain of \$960, and another gain of \$230. Log in now to see your current balance.

- a. Write an integer to represent each gain and loss.

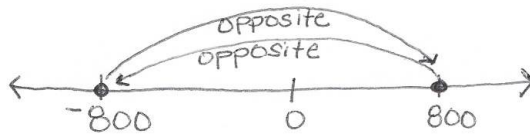
Description	Integer Representation
Loss of \$800	-800
Gain of \$960	960
Gain of \$230	230

- b. Mr. Kindle noticed that an error had been made on his account. The "loss of \$800" should have been a "gain of \$800." Locate and label both points that represent "a loss of \$800" and "a gain of \$800" on the number line below. Describe the relationship of these two numbers when zero represents no change (gain or loss).



- c. Mr. Kindle wanted to correct the error, so he entered $-(-\$800)$ into the program. He made a note that read, "The opposite of the opposite of \$800 is \$800." Is his reasoning correct?

Yes, he is correct. The opposite of 800 is -800 , and the opposite of that is 800.

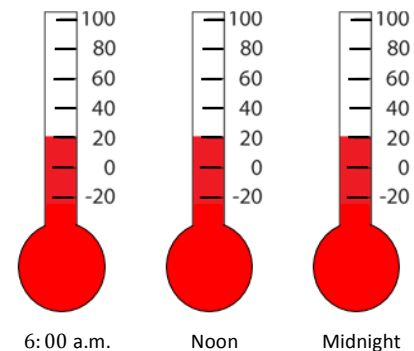


Explain.

2. At 6:00 a.m., Buffalo, NY had a temperature of 10°F . At noon, the temperature was -10°F , and at midnight it was -20°F .

- a. Write a statement comparing -10°F and -20°F .

-10°F is warmer than -20°F .



- b. Write an inequality statement that shows the relationship between the three recorded temperatures. Which temperature is the warmest?

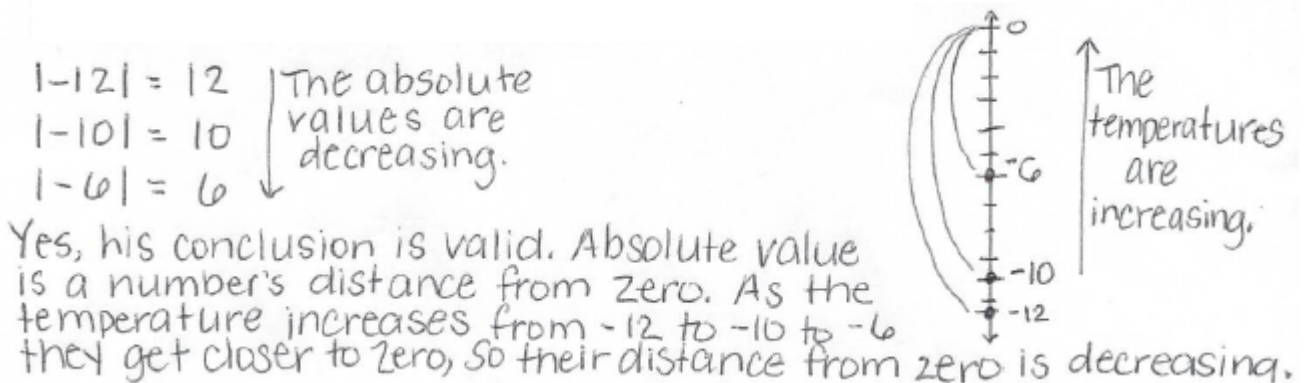
$$-20 < -10 < 10$$

10°F is the warmest temperature.

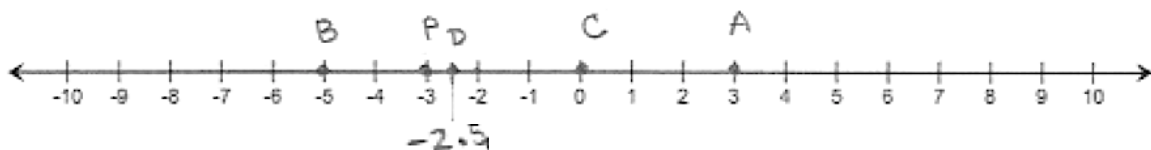
- c. Explain how to use absolute value to find the number of degrees below zero the temperature was at noon.

$$|-10| = 10 \quad \text{The temperature at noon was } 10^\circ \text{ below zero.}$$

- d. In Peekskill, NY, the temperature at 6:00a.m. was -12°F . At noon, the temperature was the exact opposite of Buffalo's temperature at 6:00a.m. At midnight, a meteorologist recorded the temperature as -6°F in Peekskill. He concluded that, "For temperatures below zero, as the temperature increases, the absolute value of the temperature decreases." Is his conclusion valid? Explain and use a vertical number line to support your answer.



3. Choose an integer between 0 and -5 on a number line, and label the point P . Locate and label each of the following points and their values on the number line.



- a. Label point A : the opposite of P

- b. Label point B : a number less than P .
- c. Label point C : a number greater than P .
- d. Label point D : a number half way between P and the integer to the right of P .
4. Julia is learning about elevation in math class. She decided to research some facts about New York State to better understand the concept. Here are some facts that she found.
- *Mount Marcy is the highest point in New York State. It is 5,343 feet above sea level.*
 - *Lake Erie is 210 feet below sea level.*
 - *The elevation of Niagara Falls, NY is 614 feet above sea level.*
 - *The lobby of the Empire State Building is 50 feet above sea level.*
 - *New York State borders the Atlantic coast, which is at sea level.*
 - *The lowest point of Cayuga Lake is 435 feet below sea level.*
- a. Write an integer that represents each location in relationship to sea level.

Mount Marcy	5,343
Lake Erie	-210
Niagara Falls, NY	614
Empire State Building	50
Atlantic Coast	0
Cayuga Lake	-435

- b. Explain what negative and positive numbers tell Julia about elevation.

A negative number means the elevation is below sea level. A positive number means the elevation is above sea level.

- c. Order the elevations from least to greatest, and then state their absolute values. Use the chart below to record your work.

Elevations	Absolute Values of Elevations
-435	435
-210	210
0	0
50	50
614	614
5,343	5,343

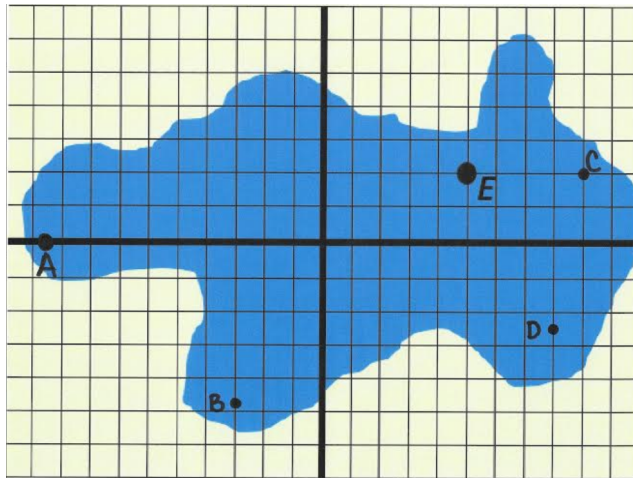
- d. Circle the row in the table that represents sea level. Describe how the order of the elevations below sea level compares to the order of their absolute values. Describe how the order of the elevations above sea level compares to the order of their absolute values.

The elevations below sea level have absolute values that are their opposites, so the order is opposite. $-435 < -210$ but $435 > 210$.

The elevations above sea level are the same as their absolute values, so the order is the same.

$$50 < 614 < 5,343$$

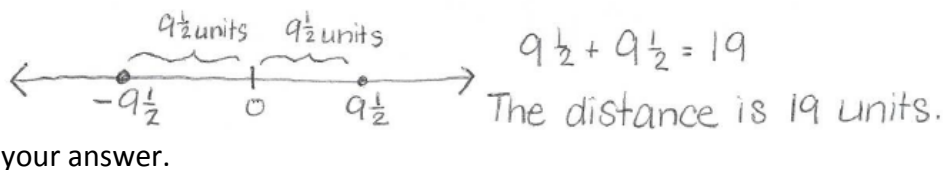
5. For centuries, a mysterious sea serpent has been rumored to live at the bottom of Mysterious Lake. A team of historians used a computer program to plot the last five positions of the sightings.



- a. Locate and label the locations of the last four sightings: $A \left(-9\frac{1}{2}, 0\right)$, $B (-3, -4.75)$, $C (9, 2)$, and $D (8, -2.5)$.

- b. Over time, most of the sightings occurred in Quadrant III. Write the coordinates of a point that lies in $(-6, -3)$ Quadrant III.

- c. What is the distance between point A and the point $(9\frac{1}{2}, 0)$? Show your work to support



- d. What are the coordinates of point E on the coordinate plane?

$(5, 2)$

- e. Point F is related to point E . Its x -coordinate is the same as point E 's, but its y -coordinate is the opposite of point E 's. Locate and label point F . What are the coordinates? How far apart are points E and F ? Explain how you arrived at your answer.

The coordinates of F are $(5, -2)$. Points E and F are 4 units apart. Since their x -coordinates are the same, I just counted the number of units from 2 to -2 (between their y -coordinates), and that is 4.